

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawing includes changes to FIG. 1. This sheet, which includes FIG. 1, replaces the original sheet including FIG. 1. In FIG. 1, a label "Prior Art" has been added.

Attachments: Replacement Sheet

Annotated Sheet Showing Changes

REMARKS

Claims 1-44 are pending in the application. Claims 5, 6, 26, and 28 are currently amended. Applicants respectfully request for allowance of all the pending claims.

Drawing Objections

FIG. 1 is objected to for omitting a legend such as "Prior Art."

FIG. 1, as amended and shown in the hereto attached drawing sheets, now includes the legend "Prior Art." Thus, Applicants respectfully request that the objections be withdrawn.

Claim Objections

Claims 6, 26, and 28 are objected to because of certain informalities.

In the amended claim 6, the phrase "any of" has been deleted. In the amended claims 26 and 28, the phrase "solid-state species conductor" has been changed to "solid-state ionic species conductor." Thus, Applicants respectfully request that the objections be withdrawn.

Rejections under 35 U.S.C. §112

Claims 5 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the amended claim 5, the trademark/trade name "nichrome" has been deleted. In the amended claim 26, the trademarks/trade names "Nafion" and "Nasico" have been deleted. Thus, Applicants respectfully request that the rejections be withdrawn.

Rejections under 35 U.S.C. §102

Claims 1, 2, 4, 6-9, 11-13, 15-18, 24, 27, 28, 32-36, and 40-44 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,827,415 to Gur et al. (hereinafter referred to as "Gur").

Independent claim 1 is directed to a contaminant molecule sensor configured for use in a vacuum environment, the sensor comprising: an electrochemical cell comprising a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species; a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species; and a solid-state ionic species conductor bridging the measurement electrode and the reference electrode, the conductor being selected to conduct an ionic species common to the dissociated contaminant and reference molecules; and means for initiating catalysis of the dissociation of the reference and contaminant molecules.

Gur fails to teach or suggest "a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." In Gur, the reference electrode 13 is consisted of a metal/metal-oxide binary mixture. *See, col. 4, lines 6-8.* The reference electrode 13 acts as a self-contained reference of oxygen level determined by chemical equilibrium between its metal and metal oxide components. *See, col. 5, lines 2-6.* In other words, the reference electrode 13 is a source of oxygen, instead of a catalyst that catalyzes a source to release oxygen. This is different from the claimed reference electrode that "catalyze[s] the dissociation of a reference molecule into its ionic species."

As such, claim 1 is not anticipated by Gur under section 102, because it fails to show each and every element of the claimed invention.

Accordingly, claims 2, 4, 6-9, 11-13, 15-18, 24, 27, 28, 32-36, and 40-44 that depend from independent claim 1 and include all the limitations recited therein are not anticipated by Gur under section 102, either.

Claims 1-4, 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,871,981 to Flais et al. (hereinafter referred to as "Flais").

Independent claim 1 discloses "a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species, and a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." Such catalytic electrodes are essential in sensing contaminants in a high vacuum environment. "[I]n order to measure pressure in vacuum environments under 1e^{-3} mbar pressure it is necessary to utilize a different type of sensor [other than conventional ones that measure a pressure differential across a conductor], e.g. ion gauges." *See, page 4, second paragraph, of the application.* "Ion gauges are hot filament sensors and measure the pressure by ionising gaseous molecules and measuring the ionic signal in order to provide an accurate pressure indication." *Id.* The working principle of ion gauges can be expressed mathematically by the following equation:

$$E \propto \frac{RT}{F} \ln \left(\frac{P_{H_{20}}}{a_{H^{+}}} \right)$$

where, E = electromotive force, R = gas constant, T = temperature in Kelvin, F = Faraday

constant, $P_{H_2(REF)}$ = partial pressure of reference source hydrogen, and $a = H^+$ activity at

the measure electrode. *See, page 14 of the application.*

Flais teaches a conventional sensor that functions based on a measured pressure differential across a conductor, instead of ionic activities. The working principles of Flais' sensor can be mathematically expressed by the following equation:

$$E = \frac{RT}{4F} \ln \left(\frac{P_2 O_2}{P_1 O_1} \right) \quad .$$

where, E = open-circuit potential, F = Faraday number, R = gas constant, T = absolute temperature, $P_1 O_2$ and $P_2 O_2$ = partial pressure of oxygen in the reference and measurement environments. *See, col. 4 lines 21-37.* It is clear that Flais directly measures partial gas pressures of the reference and measurement environments when sensing a gas concentration. Flais is not concerned of ionic activities, which is part of the equation based on which the claimed sensor functions.

Flais fails to teach or suggest the claimed features, "a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species, and a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." As a result, although Flais' sensor may work in an atmospheric environment, it won't necessarily function well in a high vacuum environment.

As such, claim 1 is not anticipated by Flais under section 102, because it fails to show each and every element of the claimed invention.

Accordingly, claims 2-4, 6 and 7 that depend from independent claim 1 and include all the limitations recited therein are not anticipated by Flais under section 102, either.

Claims 1, 11, 21, 25, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,650,054 to Shen et al. (hereinafter referred to as "Shen").

With regard to independent claim 1, Shen fails to teach or suggest "a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." As clearly shown in FIG. 1 of Shen, the reference electrode 14 associates ionic species into reference molecules, instead of the other way around.

As such, claim 1 is not anticipated by Shen under section 102, because it fails to show each and every element of the claimed invention.

Accordingly, Claims 11, 21, 25, and 26 that depend from independent claim 1 and include all the limitations recited therein are not anticipated by Shen under section 102, either.

Rejections under 35 U.S.C. §103

Claims 5, 10, 14, 19, 20, 22, 23, 29-31, 37, 38, and 39 are rejected under 35 U.S.C. 103 as unpatentable over Gur, Flais, Shen, and further in view of U.S. Patent No.

Application. No. 10/551,147

Amendment dated July 09, 2009 Reply to Office Action of February 20, 2009

Attorney Docket No.: M02B166

5,683,570 to Pacey et al., U.S. Patent No. 4,121,988 to Sano et al, U.S. Patent No.

4,882,032 to Tiwari, U.S. Patent No. 6,365,022 to Hitchman et al., U.S. Patent No.

5,331,310 to Stetter et al, and U.S. Patent No. 4,370,206 to Razumney et al.

For the reasons discussed above, independent claim 1 is patentable over Gur, Flais, or Shen under section 102. Accordingly, claims 5, 10, 14, 19, 20, 22, 23, 29-31, 37, 38, and 39 that depend from independent claim 1 and include all the limitations recited therein are also patentable over the cited prior art references under section 103.

CONCLUSION

Applicants have made an earnest attempt to place this application in an allowable form. In view of the foregoing remarks, it is respectfully submitted that the pending claims are drawn to a novel subject matter, patentably distinguishable over the prior art of record. Examiner is therefore, respectfully requested to reconsider and withdraw the outstanding rejections.

Should Examiner deem that any further clarification is desirable, Examiner is invited to telephone the undersigned at the below listed telephone number.

Applicants do not believe that any additional fee is due, but as a precaution, the Commissioner is hereby authorized to charge any additional fee to deposit account number 50-4244.

Respectfully submitted,

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